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(54) Building block

(57) The block is hollow and has spaced side walls (20, 30) interconnected by integral webs and end walls (32, 32a). In the vertical and horizontal edge surfaces of the side walls tongues (2, 2a) and grooves (1a) are provided adapted to be engageable with grooves and tongues of adjacent blocks. The end walls are

recessed and have cutouts to form, after assembly, communicating vertical and horizontal passages for receiving reinforcing members and to be filled with concrete. The building block may form part of a wall building system comprising module blocks of different sizes as well as corner blocks and cavity closure members. Details of using the system at corners and around window apertures are given.

Fig. 3

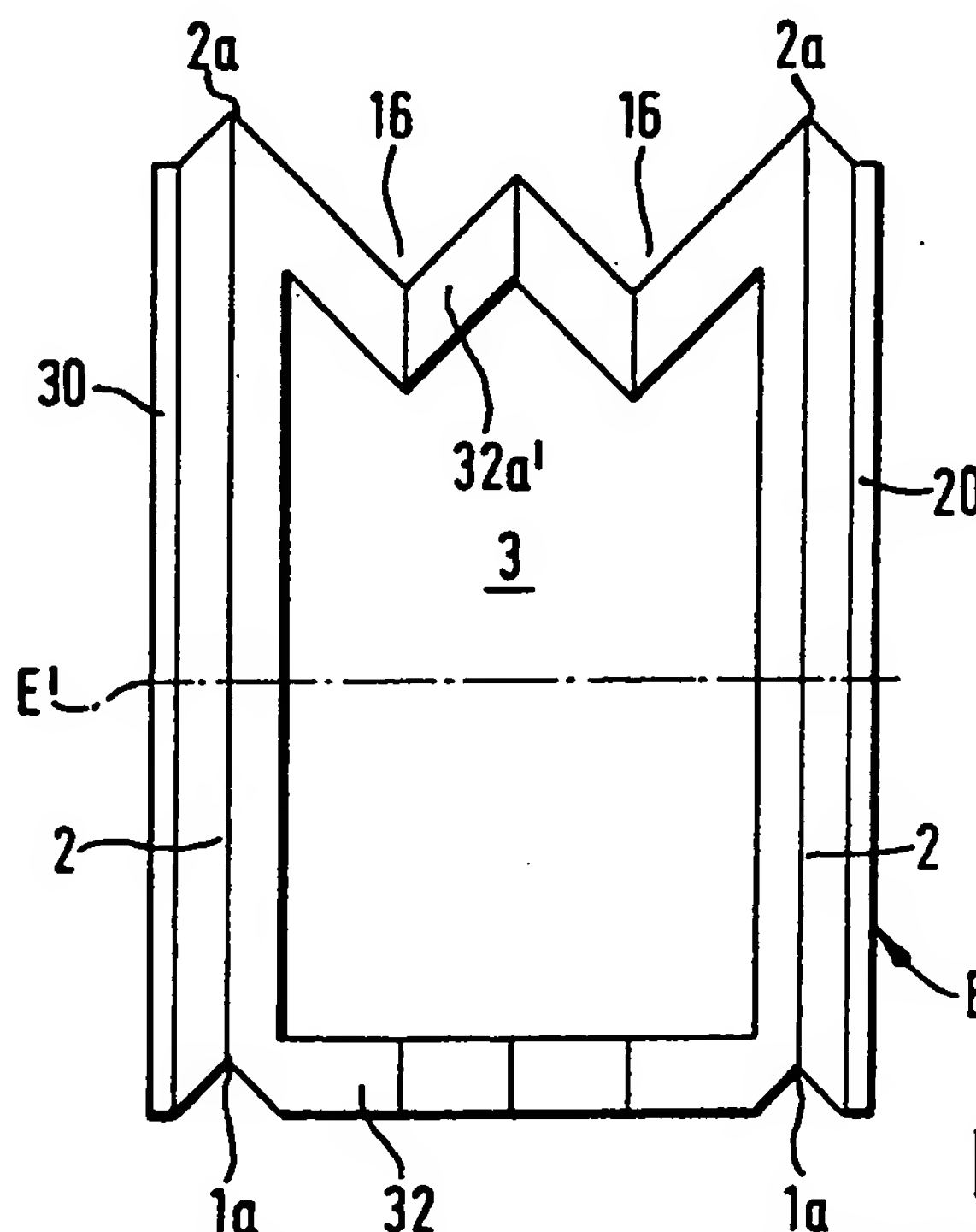
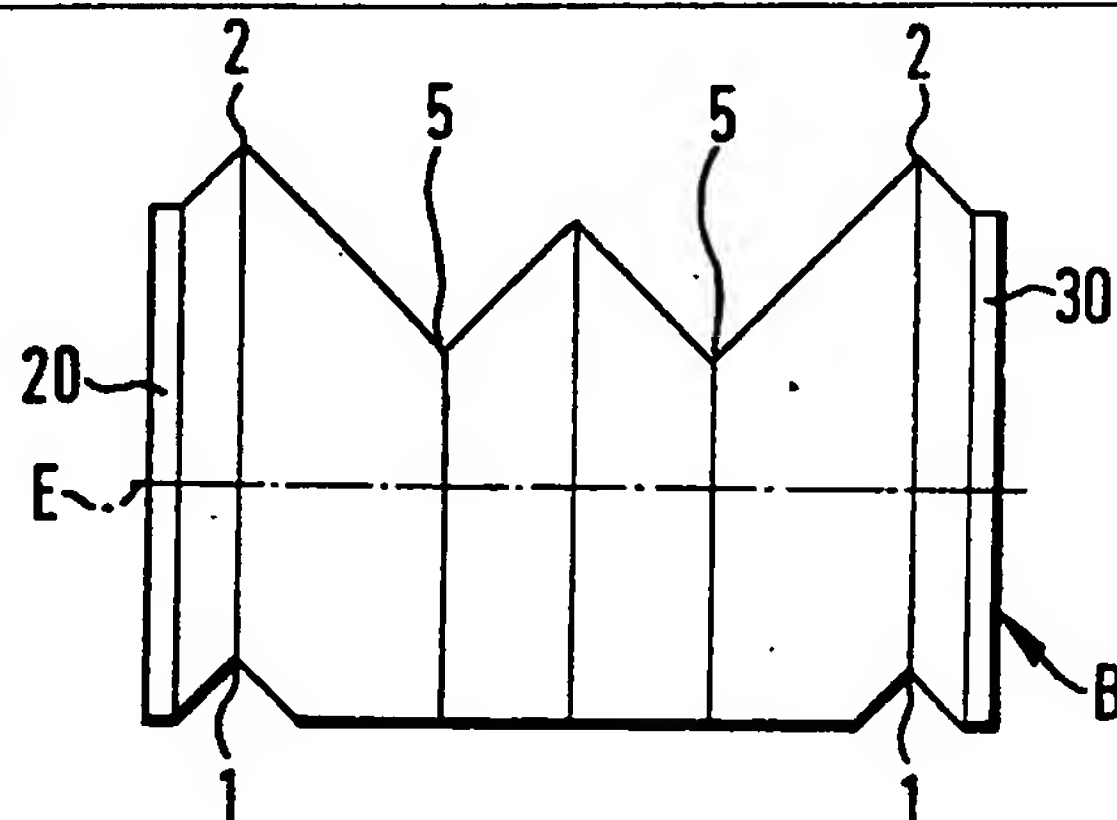


Fig. 4

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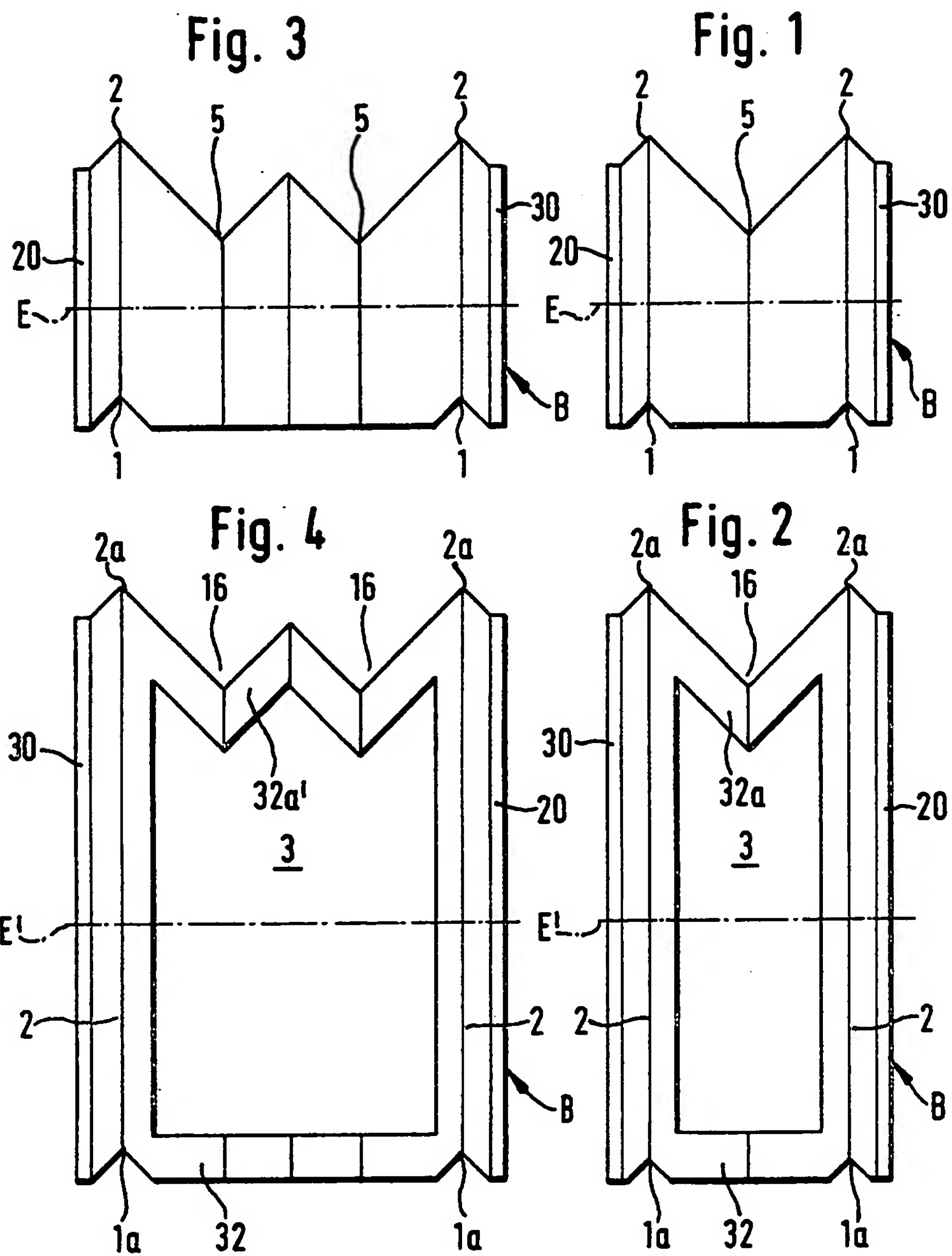


Fig. 5

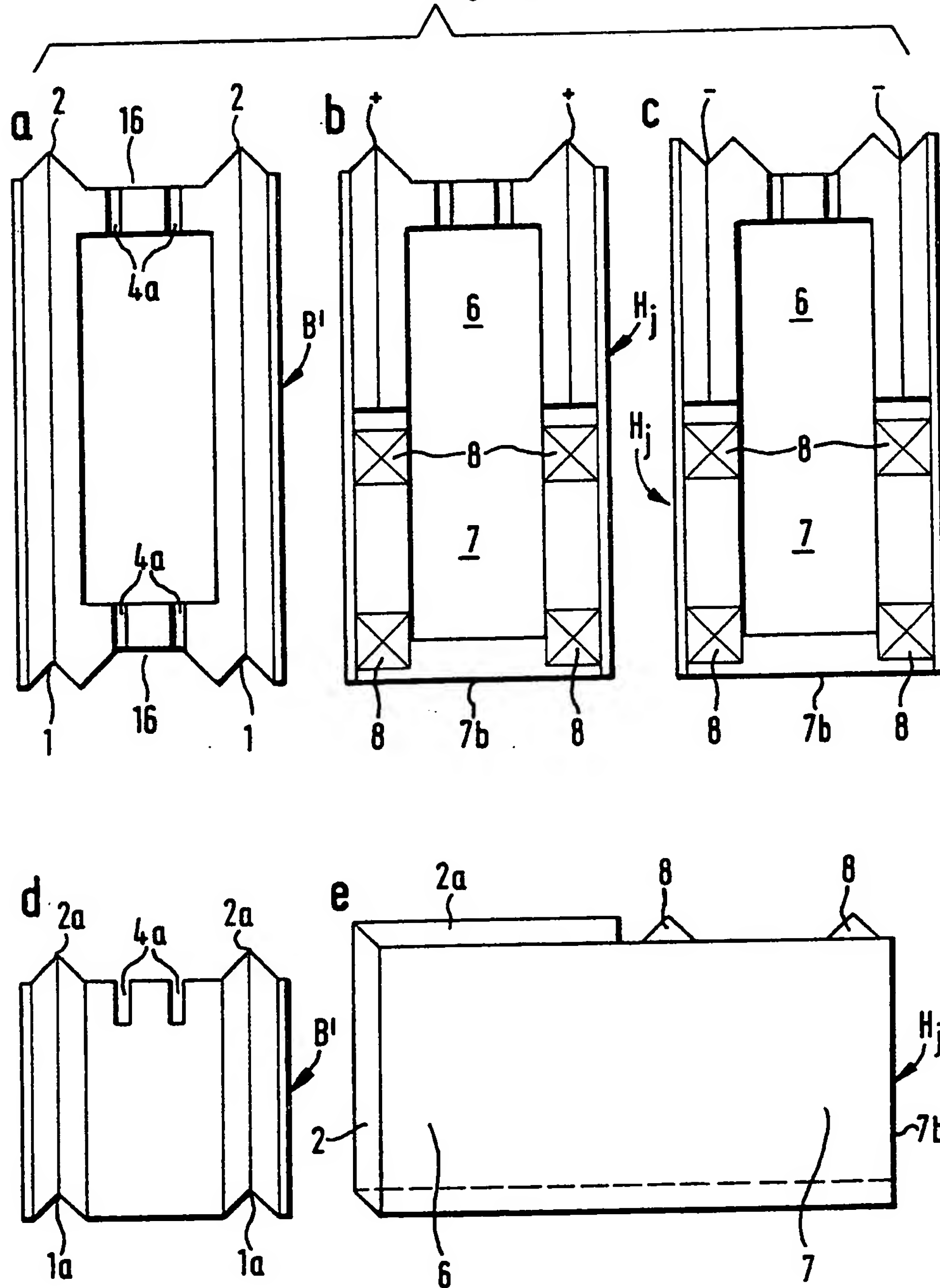


Fig. 5

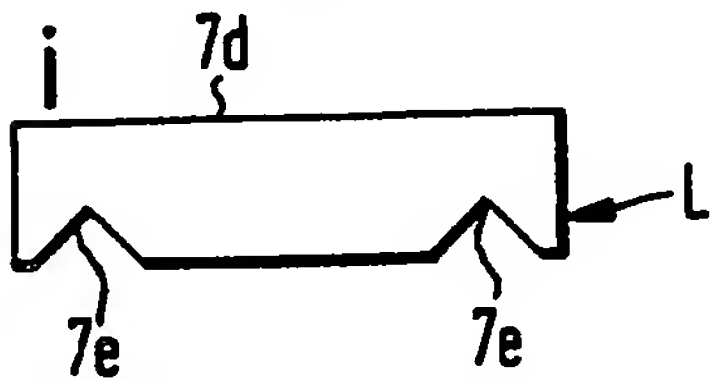
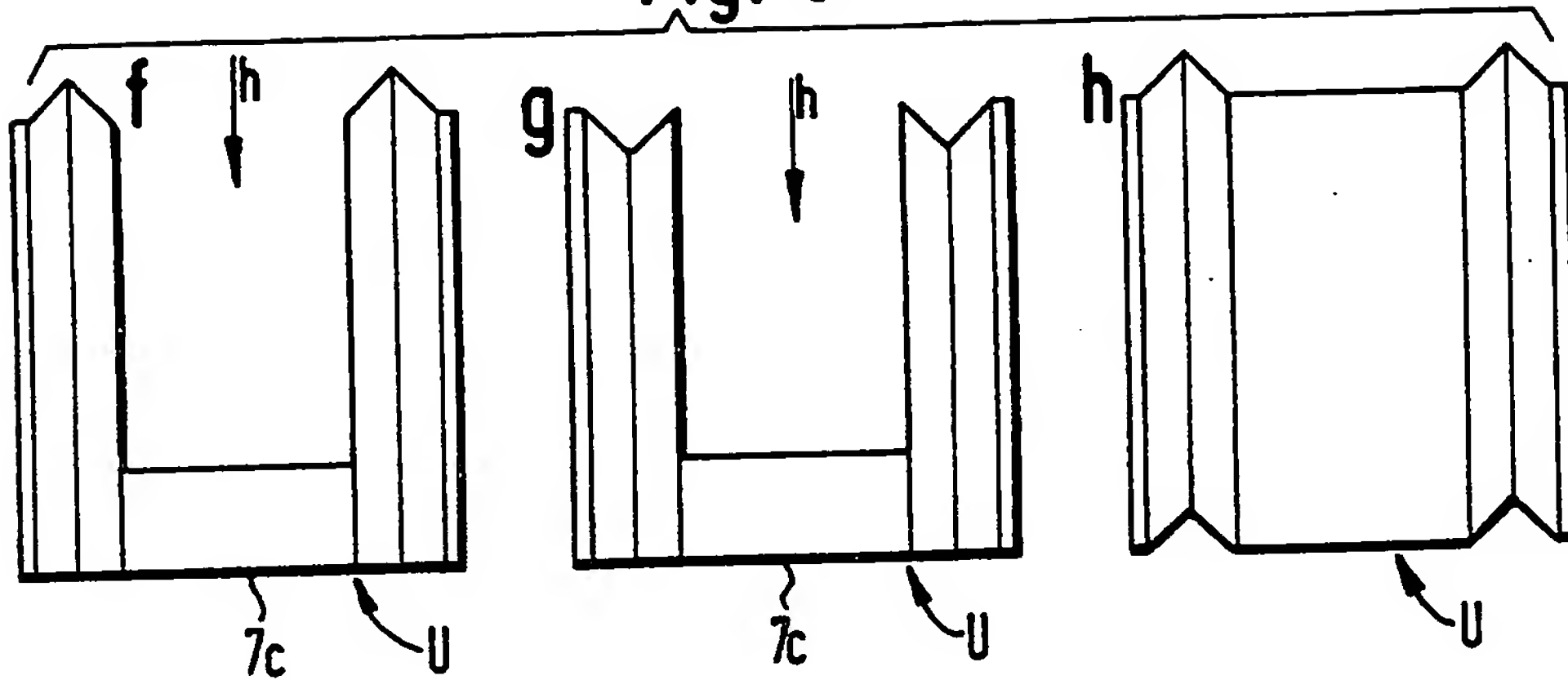


Fig. 6

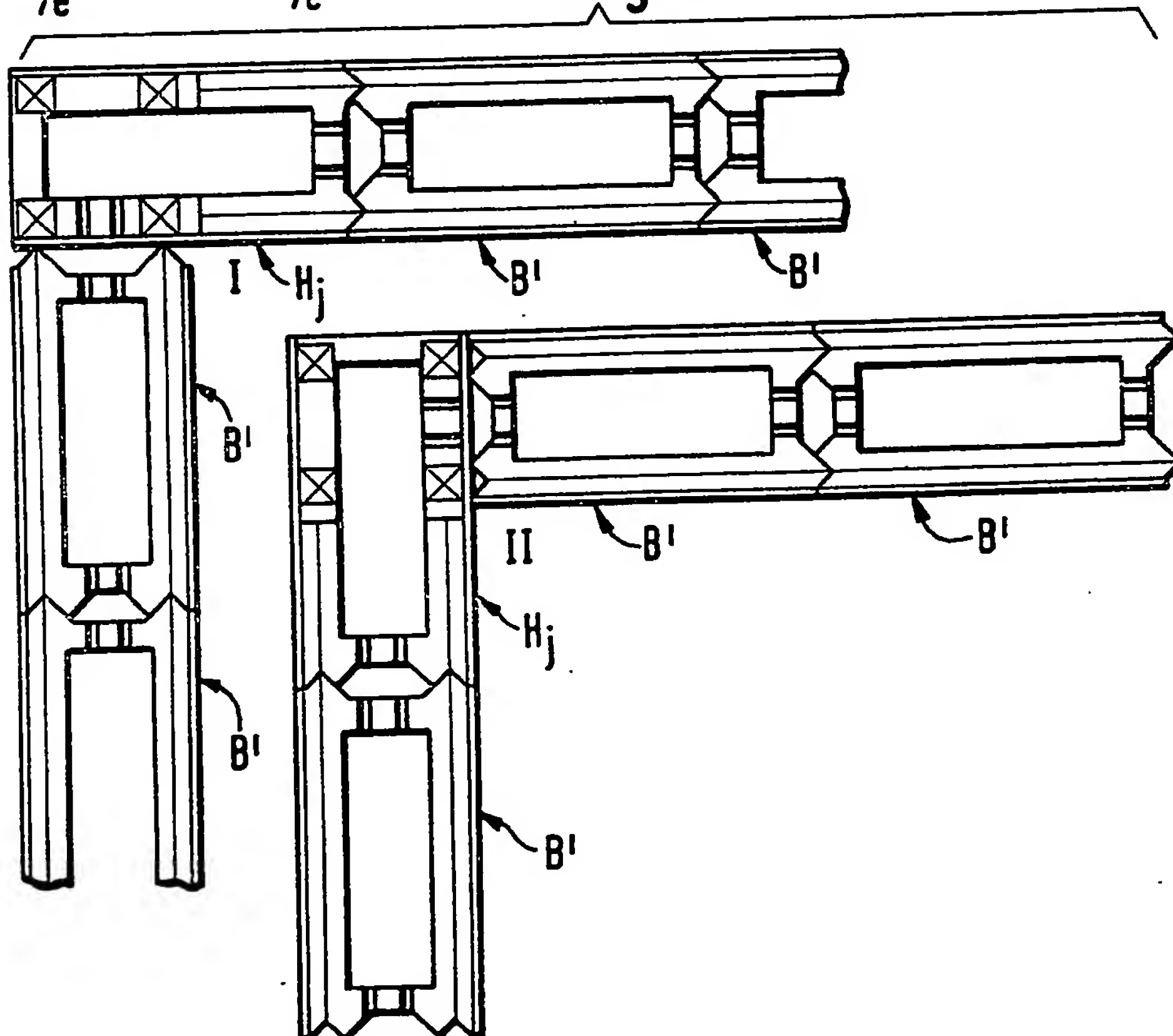
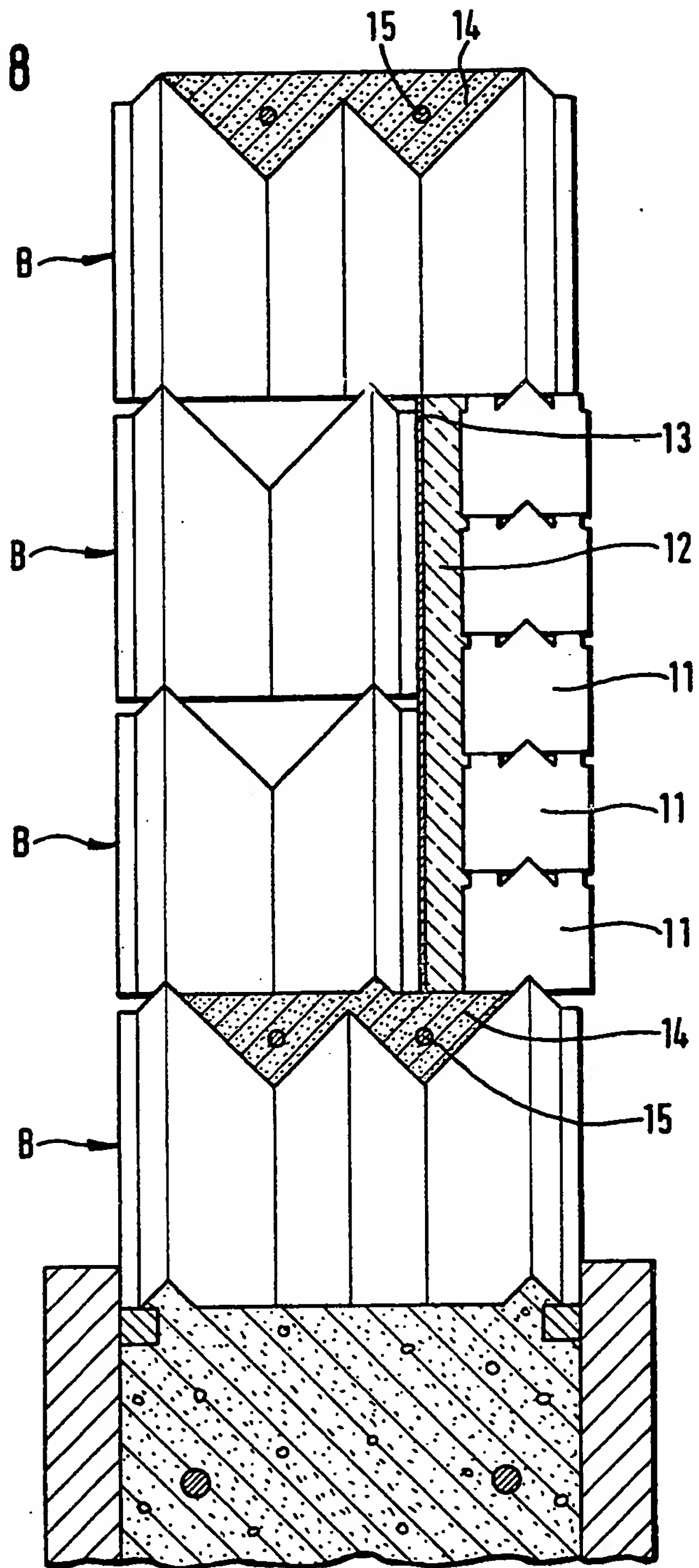
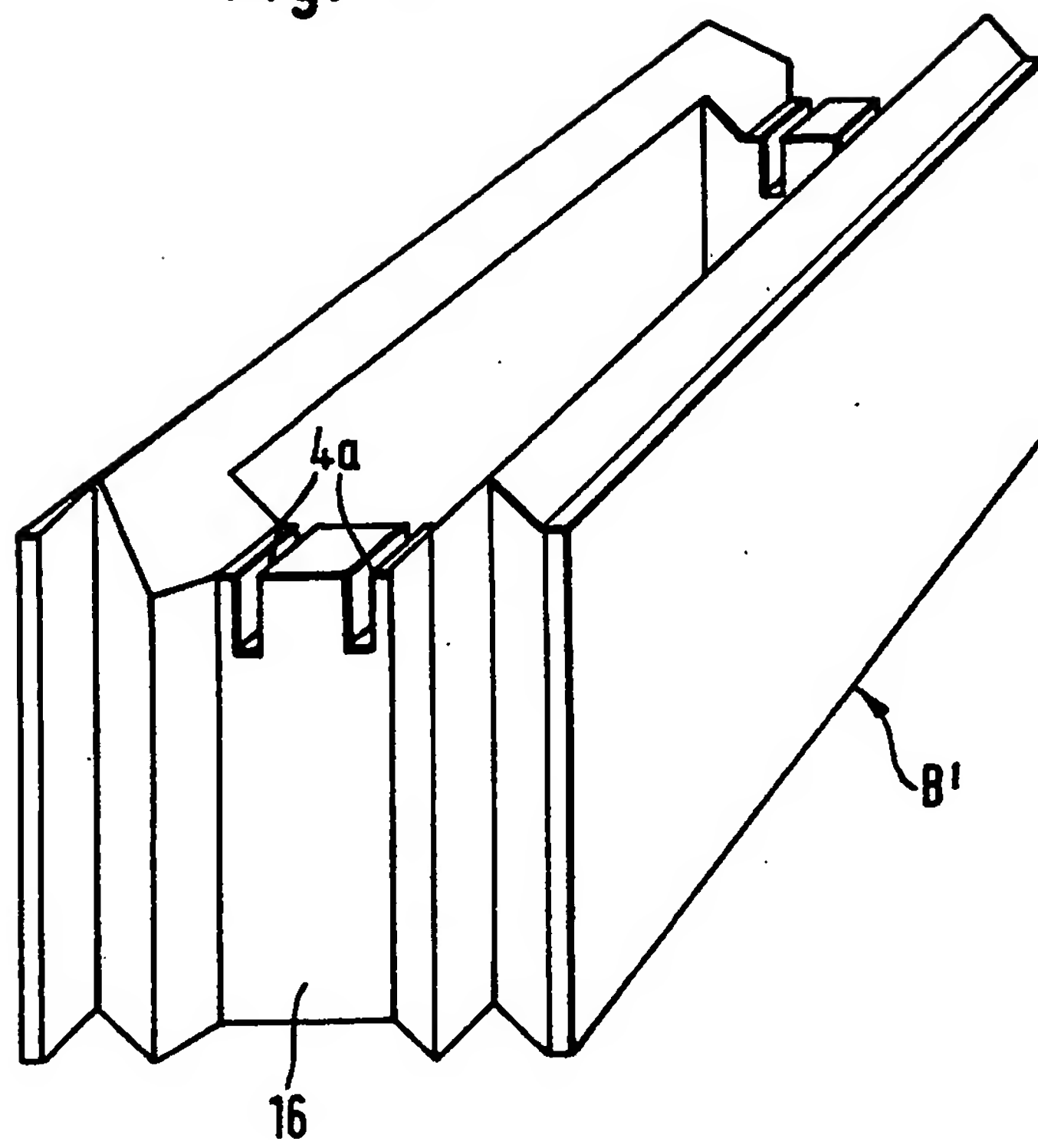


Fig. 8



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Fig. 9



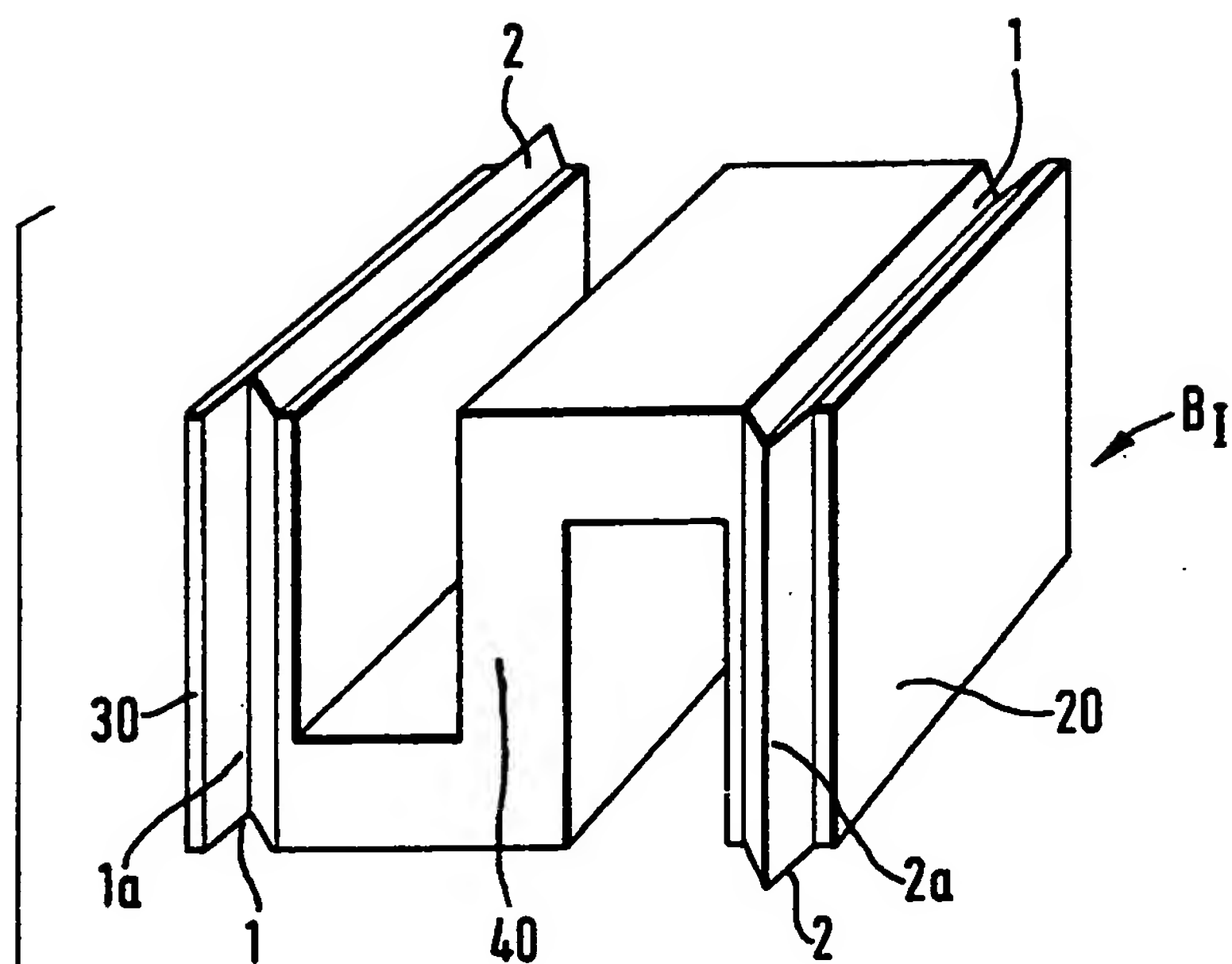
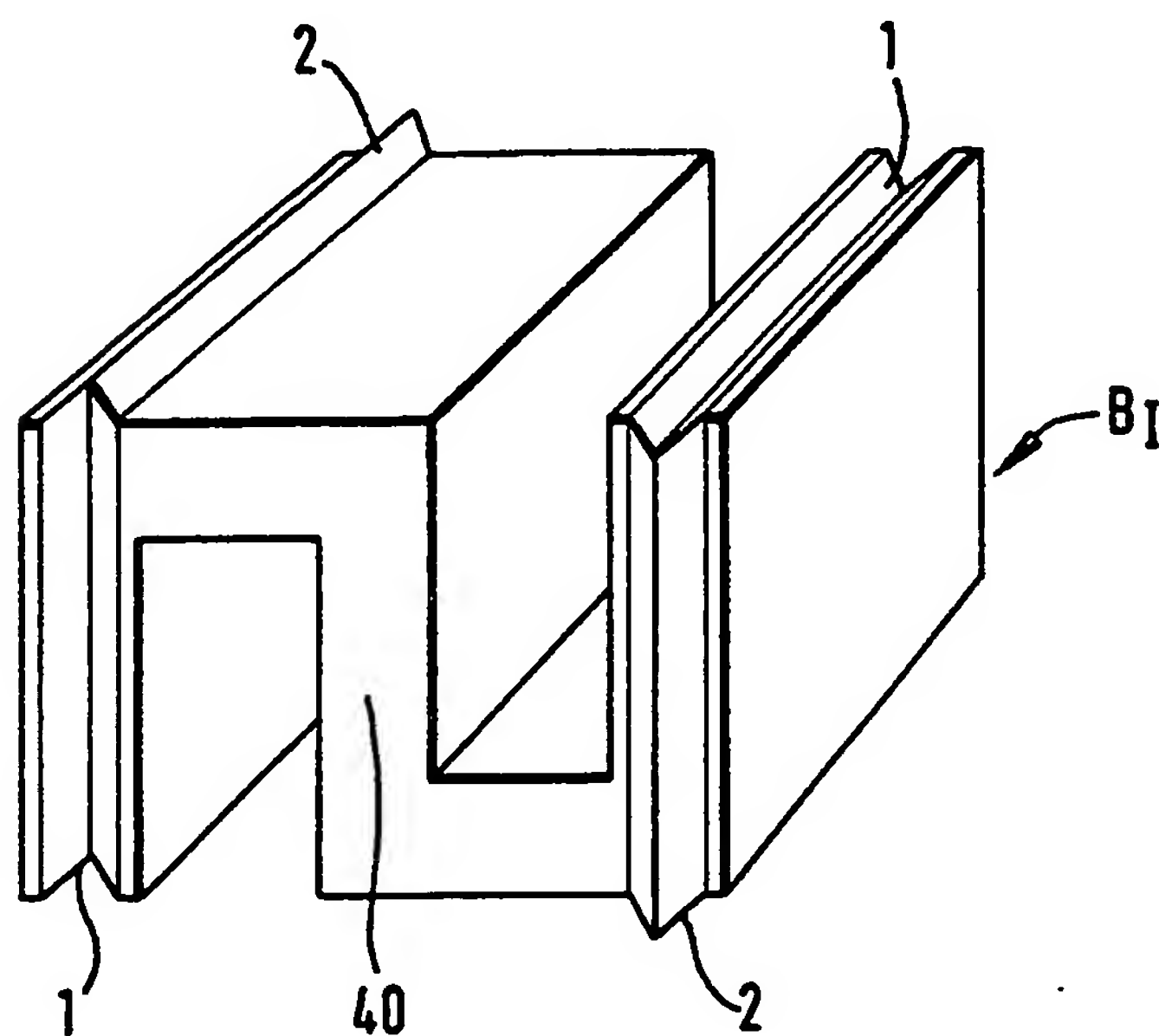


Fig. 10



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Fig. 11

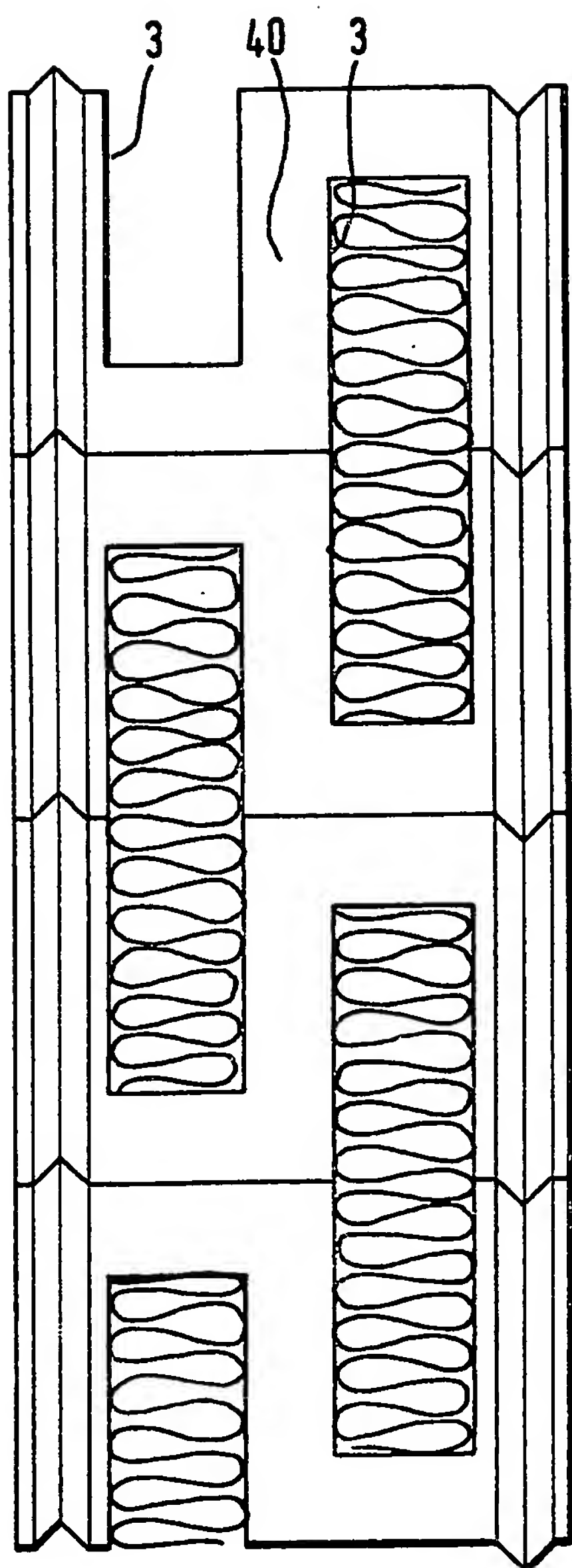
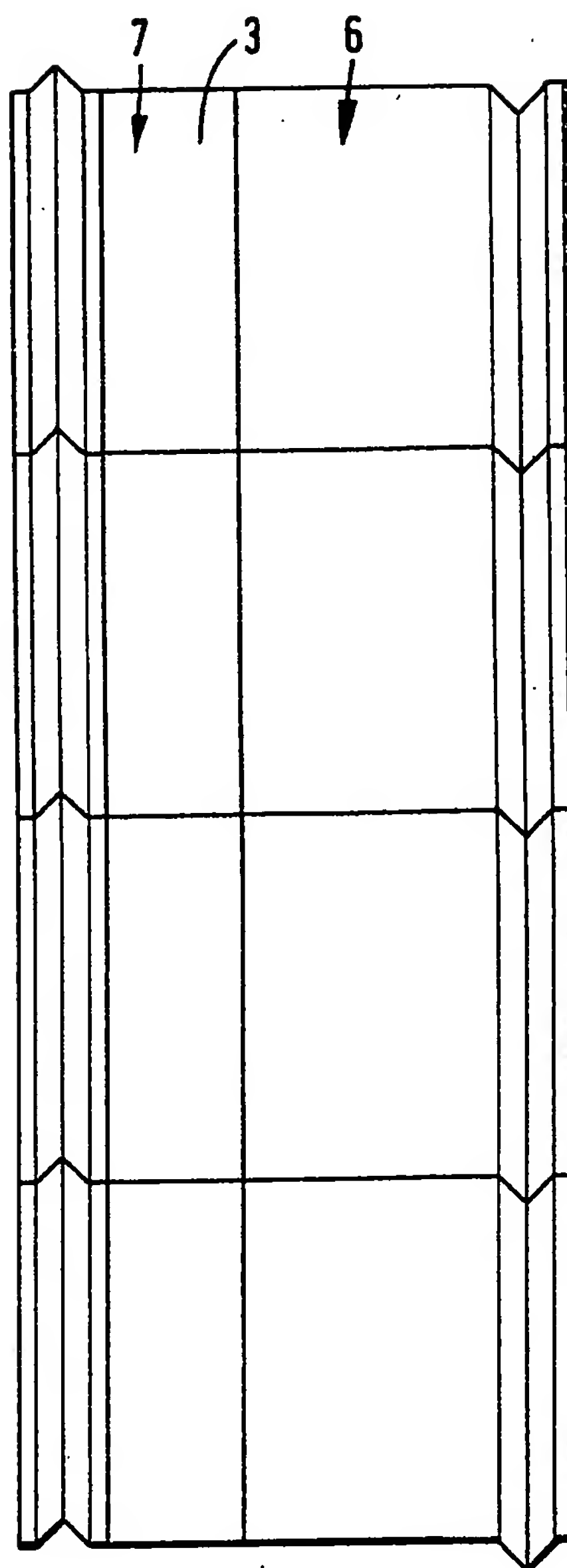
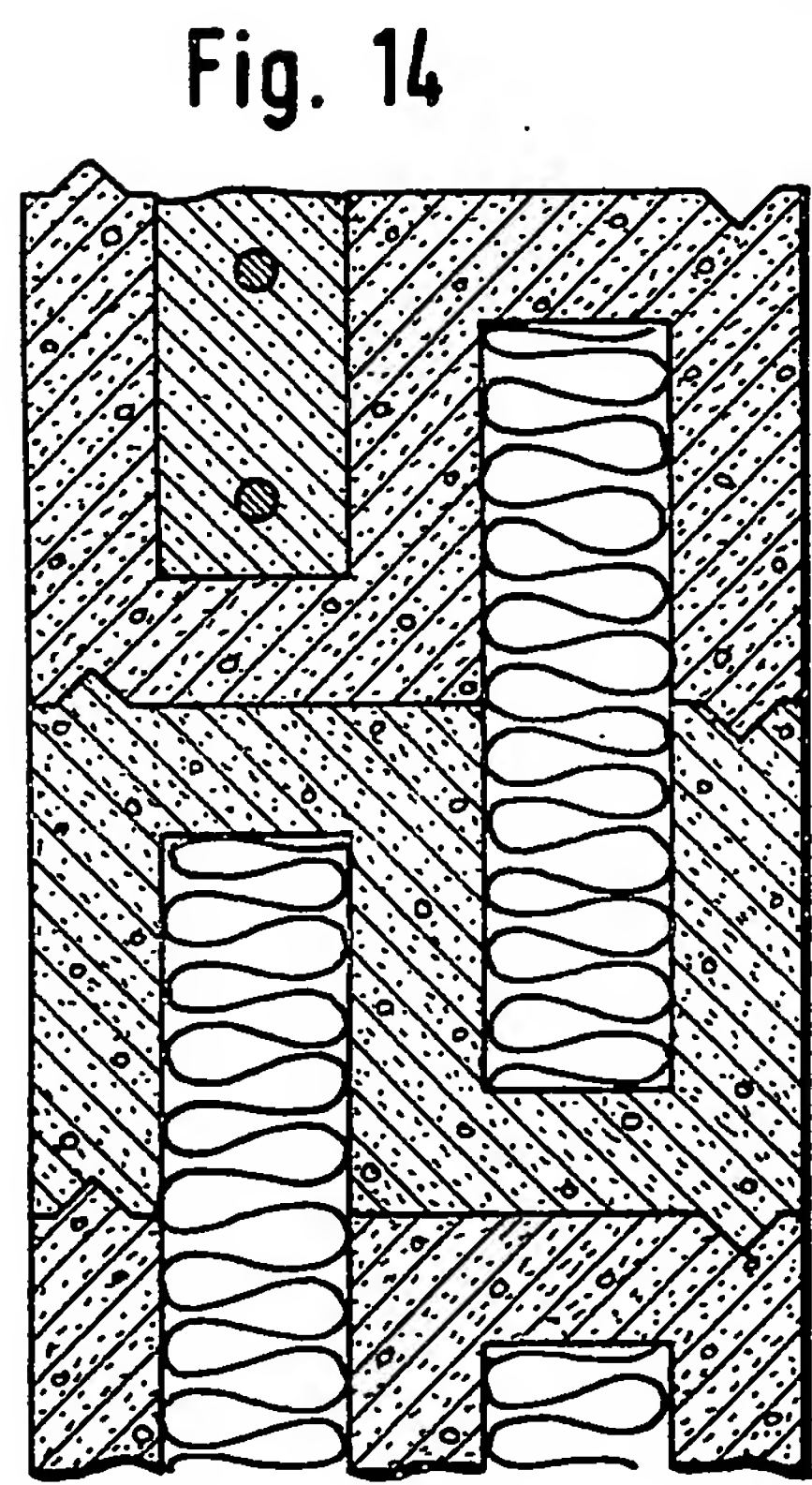
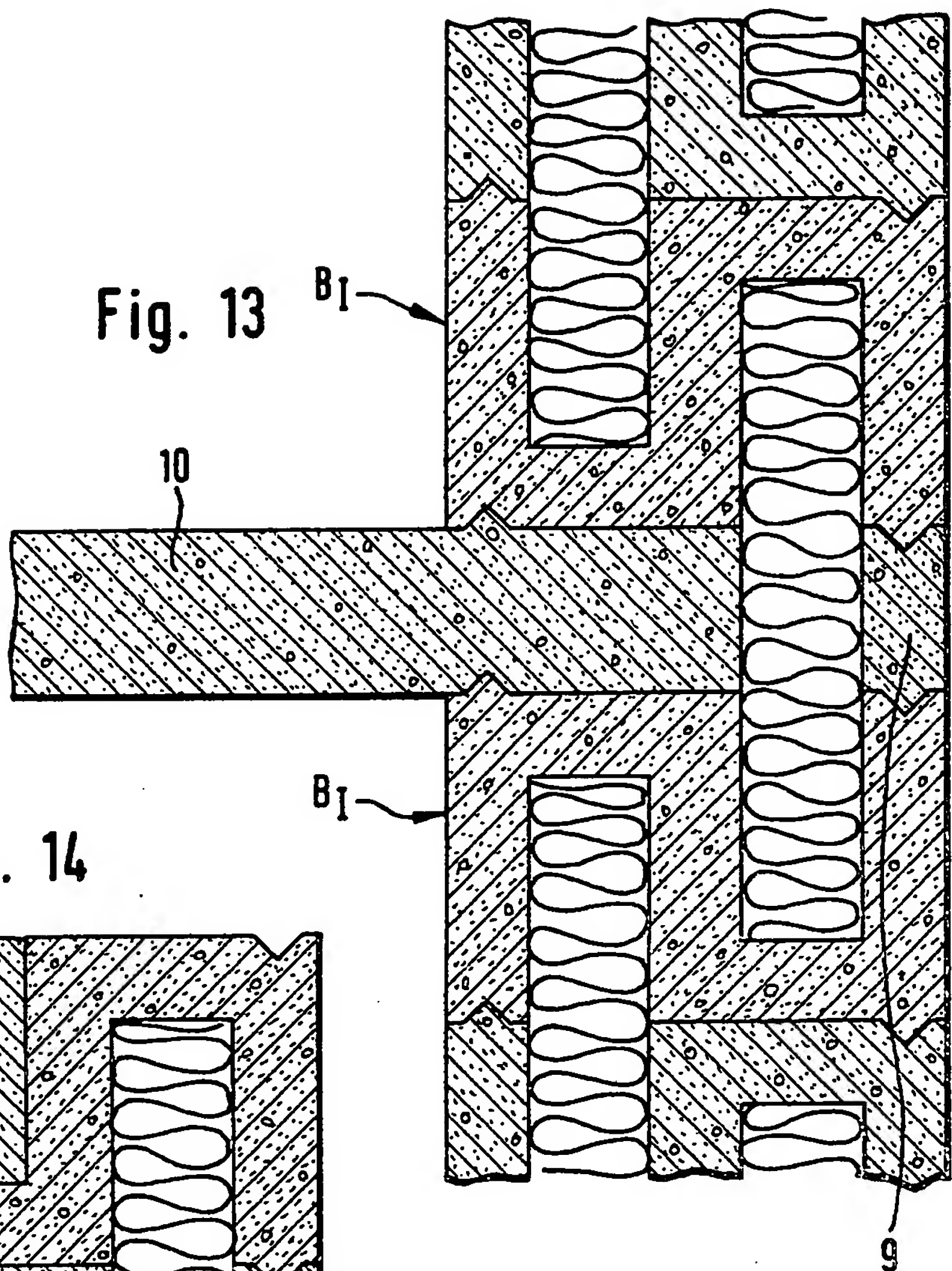


Fig. 12





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Fig. 15

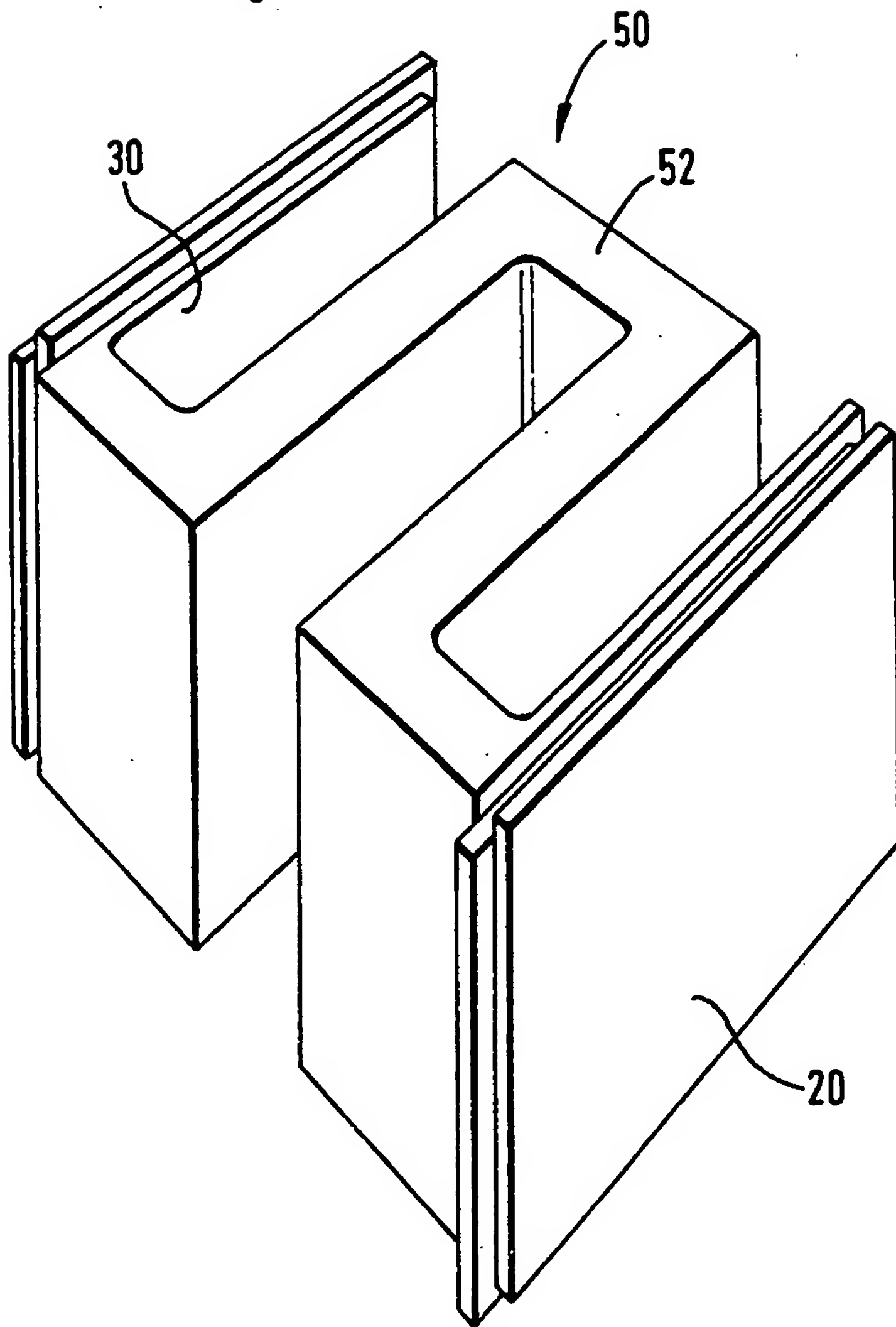
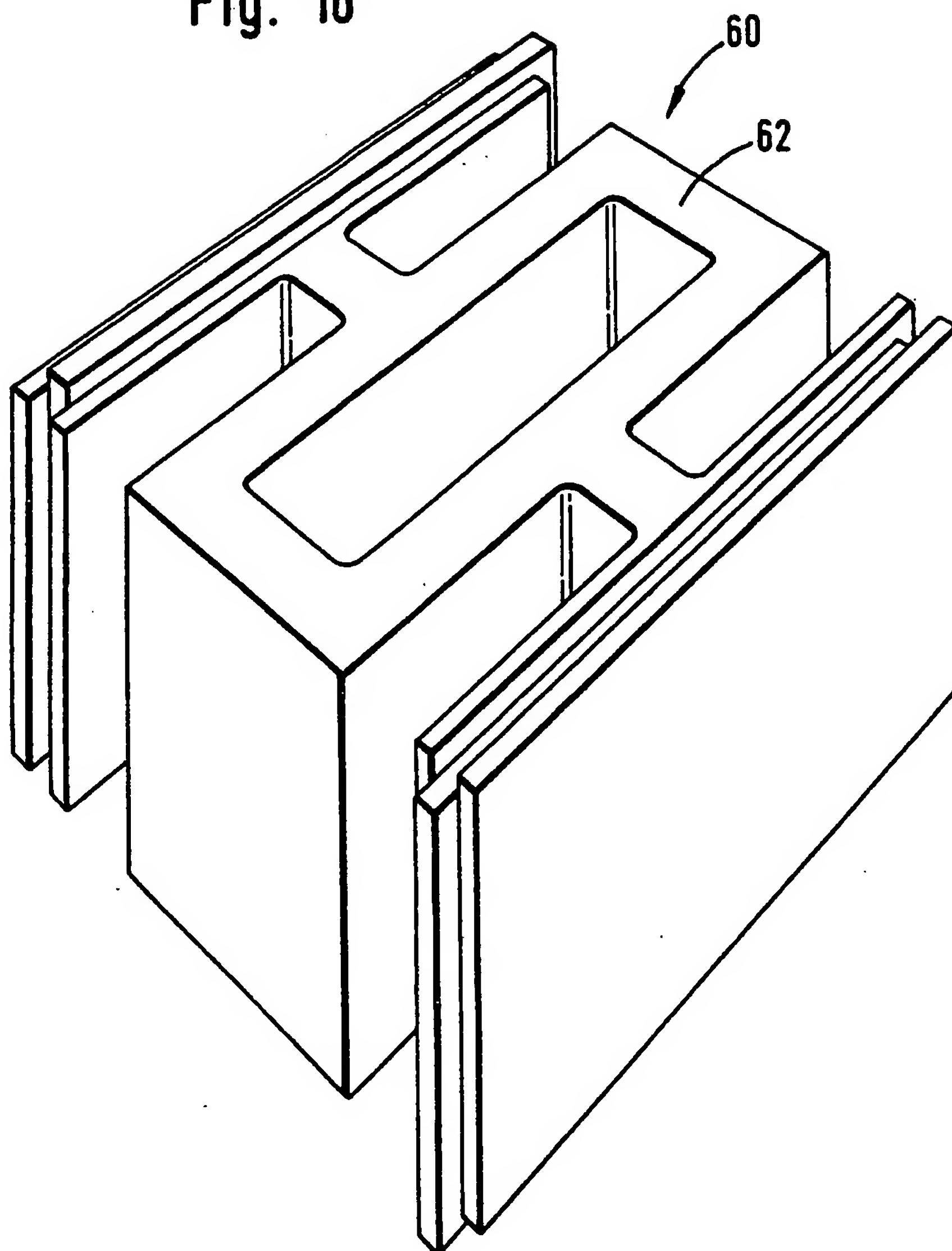
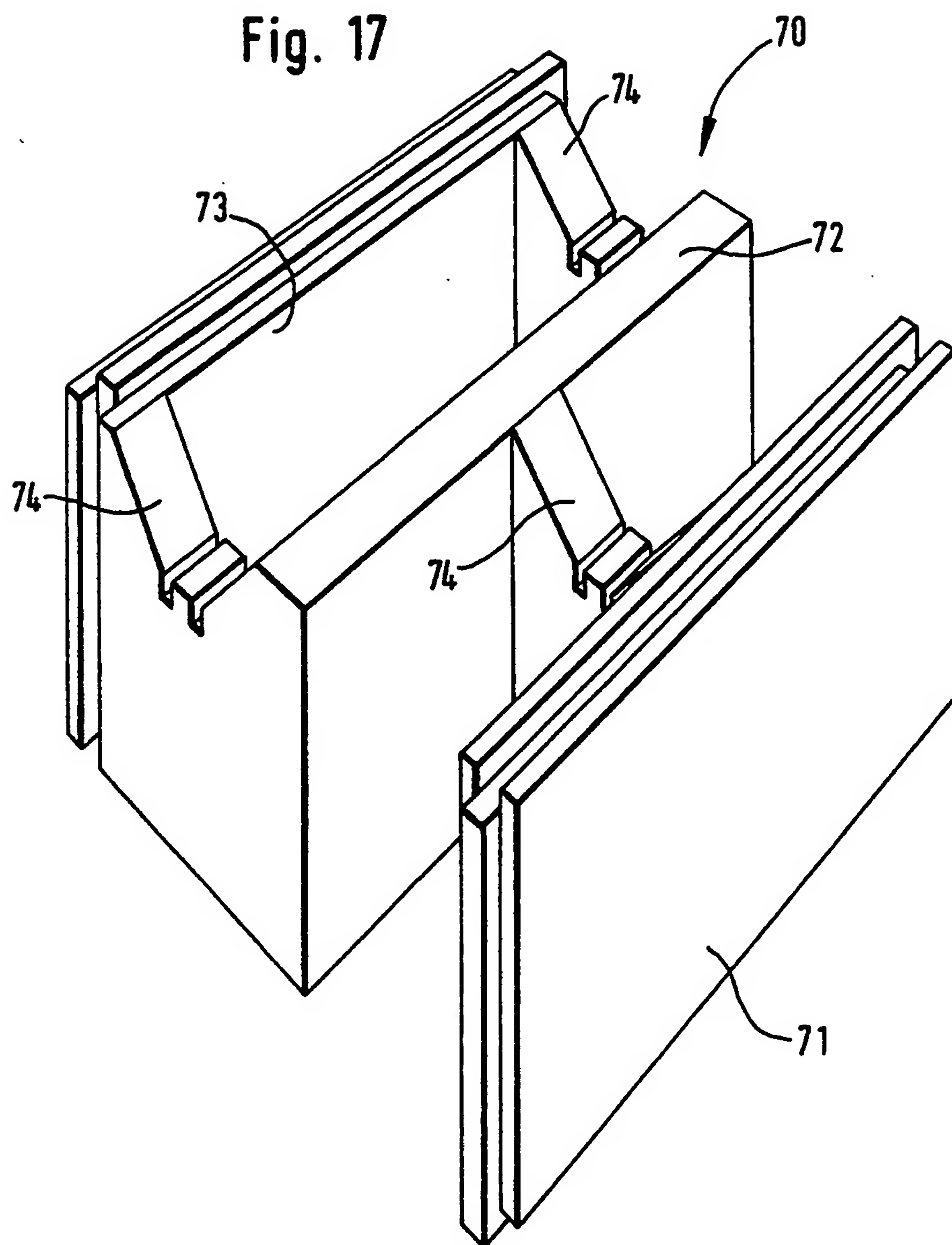


Fig. 16



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Fig. 17



SPECIFICATION

Hollow building block and building block system

The invention relates to a building block system and a building block made from concrete or similar material and adapted to be assembled by engageable tongue and groove means.

It is known to make wall blocks from concrete or similar material and it is also known to provide such wall blocks with tongues and grooves for controlled assembling. However, the brick-laying itself by the previously known embodiments was rather time-consuming and there was no possibility of reinforcing the wall in any simple way. In addition the previously known wall blocks made from concrete were relatively heavy in weight and they would require considerable extra insulation against heat transfer.

French patent No. 1 319 058 thus describes a hollow building block having tongues and grooves in one direction and otherwise provided with smooth side surfaces.

It is further known from French patent No. 1 525 575 to produce building blocks designed for mosaic assembling and having a relatively complicated form which will make the production of the brick rather difficult.

The present invention has as its main purpose to provide a hollow building block and building block system made from concrete or similar material and enabling the reinforcing of the assembled product possibly even after the assembling and of a design which will reduce the construction time remarkably at the same time as the block is lighter in weight compared with usual wall blocks, but still has sufficient strength and does not require the same amount of insulation against heat conduction as it is the case for known wall blocks. The hollow building blocks according to the invention may be fully or partly filled with cast reinforcement and/or insulation.

In accordance with the invention the hollow building block comprises two laterally spaced side walls interconnected by at least one web means and having at least one cavity open at the top and bottom of the block, horizontal and vertical edge surfaces of the side walls being provided with tongue and groove means, each side wall having in a first pair of adjacent edge surfaces tongue means and in the other pair of adjacent edge surfaces groove means, the tongue and groove means in each of the side wall edge surfaces being dimensioned so as to be closely receivable in groove and tongue means of adjacent blocks.

The building block system comprises in combination while module blocks constructed as described hereinbefore, half module blocks and quarter module blocks supplemented by corner blocks and insulation blocks for the construction of foundations, walls, partitions, pillars, etc, the module block being rectangular and comprising a cavity with open top and bottom.

The invention will be better understood from the following more detailed description with

reference to the drawings, wherein:

Figures 1 and 2 represent a full module block in one size seen from the end and from above respectively,

Figures 3 and 4 represent a larger module block like-wise from the end and from above respectively,

Figures 5a to 5i represent an embodiment of a modified module block, corner block, half module block and auxiliary block,

Figure 6 shows an embodiment of a corner construction using the blocks of Figure 5,

Figure 7 shows a wall construction with a window opening and using the half blocks (U-blocks) and "closures."

Figure 8 shows a section of a wall portion comprising usual module blocks and large module blocks as well as a blind wall of small massive blocks without heat conduction and insulation means in the wall,

Figure 9 shows in perspective view the modified module block respectively from above and from below for better understanding of the particular form of the block,

Figure 10 shows a modification of the hollow building block in front view and rear view,

Figure 11 shows four blocks of Figure 10 stacked on one another and having the cavities formed by said stacked blocks filled with insulation mats,

Figure 12 shows a horizontal row of four blocks of Figure 10 forming an open groove for insertion of insulation mats,

Figure 13 shows the use of the Figure 10 blocks in connection with a concrete floor by addition of an adapting slab,

Figure 14 shows a wall constructed with the hollow building block of Figure 10, the upper cavity having been filled with concrete and reinforced,

Figure 15 shows a further modified embodiment of the block,

Figure 16 shows a modification of the block of Figure 15, and

Figure 17 shows a block with an additional intermediate wall.

The module block B according to the present invention in its most applicable embodiment is shown in Figures 1 and 2 of the drawings in an end view and a top view respectively. It should be noted that in the present description the building system of hollow blocks and the single blocks are so described as having their longitudinal axis directed horizontally, but in some cases the blocks may also be positioned vertically.

As shown in Figures 1 to 4, the building block B has two laterally spaced side walls 20, 30 interconnected by two webs 32, 32a to form a central internal cavity 3 open at the top and at the bottom of the block.

As shown in Figures 1 and 3, the block B has longitudinal grooves 1 at the side wall bottom edge surfaces and corresponding longitudinal tongues 2 at the side wall top or upper edge surfaces. The block B is accordingly asymmetric

about a central horizontal plane E. By means of these grooves and tongues the blocks may be placed on each other or superposed in a vertical direction with positive guiding. As shown in Figures 2 and 4 the block B also has a corresponding groove and tongue form at the side wall vertical edge surfaces, more particularly with tongues 2a on both side walls at one end of the block and with grooves 1a on both side walls at the other end thereof. Accordingly the block B is also asymmetric about a central transverse vertical plane E'. These groove and tongue forms serve to guide the blocks in a longitudinal or horizontal direction.

- 15 Accordingly, each side wall 20, 30 has in a first pair of adjacent edge surfaces tongues 2, 2a and in the other pair of adjacent edge surfaces grooves 1, 1a. The tongues and grooves are dimensioned so that the individual blocks may be assembled with the grooves of each block closely receiving the tongues of adjacent blocks so as to permit the construction of walls or the like without mortar to be distributed between the blocks for bonding them together.
- 25 The cavities 3 are used for reinforcing the walls or the like built up by means of the hollow building blocks B according to the invention, by filling the cavities after assembling of the building blocks with insulation material or concrete, separately or in combination. Moreover, a finished assembled wall of hollow building blocks according to the invention may be reinforced by vertical rods, the blocks for this purpose being provided with a V-shaped web 32a (Fig. 2) or a W-shaped web 32a (Fig. 4). The upper surfaces of the webs 32, 32a, 32a' having V-shaped cutouts 5 for introduction of horizontal reinforcing rods.

- Referring to Figures 5a and 5d a modified module block B' is shown in top view and end view. It will be obvious from these figures that the block has grooves 1 at one end in Figure 5a and tongues at the other end in the same figure. Likewise, the block B' has grooves and tongues on the upper and lower edge surfaces respectively (see Figure 5d) designated by 1a and 2a respectively. Furthermore, in Figures 5a and 5d grooves or openings 4a are provided in both webs or end walls of the block B' for the arrangement of reinforcing rods (not shown). In addition both webs or end walls have vertical recesses 16 suitable for filling with concrete insulation material or reinforcing members (not shown).

- A corner block Hj is shown in top view in the Figures 5b and c, the first one being a convex block (tongues at +) and the other one a concave block (groove at -), in relation to the upper end of the blocks. One half portion 6 of the corner block Hj is identical to a half module block B' as shown in Figure 5a, whereas the other half portion 7 of the corner block is formed so that it can be assembled with other blocks to form for example a wall corner as shown in Figure 6. The other half 7 of the corner block Hj in Figure 5b, c may be assembled with, for instance, the module block B' shown in Figure 5a, either in the same direction

- shown or rotated 90° or 180° with the convex side against the concave side, the tongue form 2a on the half portion 7 being substituted by protruding points 8 forming the corners of a square having a side-length equal to the distance between the tongues 2a. Furthermore, the half portion 7 has a smooth end wall 7b without any tongues or grooves, for terminating wall corners, openings and so forth, see also Figure 6. The points 8 which in the half portion 7 of the corner block in Figure 5b, c, d are substituted for the tongues, have pyramidal form and fit into the grooves 1a of the blocks when assembled.

- Figure 6 shows the construction of a corner by means of the module blocks and the corner blocks shown in Figure 5a, d and Figures 5b, c respectively. The corner is constructed by alternating the layers "I" and "II" as is well known per se.

- Figures 7 and 8 illustrate an example of a window opening and how a smooth surface in the opening is obtained by the use of corner blocks, half blocks and closing elements. These blocks being designated in the drawing by "Hj", "U" and "L" respectively.

- The smooth lateral sides of the window opening being constructed by alternatively using corner blocks HJ and half blocks U. The half blocks U shown in greater detail in Figs. 5f, g, h, are generally U-shaped with one smooth end wall 7c. The cavities of the module blocks at the lower limit of the window opening are closed by closing elements C, one such closing element being shown in Fig. 5i, said closing element having a flat top surface 7d and grooves 7e in their bottom surface. The upper limit of the window opening is formed again by closing elements U turned with their open side upwardly. Reinforcing bars are placed into said communicating openings and they are thereafter filled with concrete.

- Figure 8 shows a wall construction comprising usual and large module blocks B of Figures 1 to 4 together with a blind wall consisting of small massive blocks 11 and intermediate insulation 12 which possibly may be introduced against a foil 13 in order to provide a blind wall without heat conduction. Figure 8 furthermore shows some examples of fillings 14 consisting of additional concrete with reinforcing members 15.

- As already mentioned above, the cavities of the blocks may be filled with insulation material or concrete and may also be provided with reinforcing members.

- Figure 9 shows the modified block B' of Figures 5a, d on a larger scale in perspective view.

- The block construction system of the invention also comprises insulation blocks B_i as shown in Figures 10—14 from which it will be obvious that the insulation block has the same grooves and tongues as the module blocks and thus is suitable for the construction of a wall in the so-called dry form and providing an effective sound and thermal insulation.

- The arrangement of the grooves and tongues differs however from the preceding embodiments

in the following respect. In the left side wall 90 of the two blocks shown the upper edge surface has a tongue 2 and the lower edge surface has a groove 1 while the forward edge surface has a groove 1a and the rear edge surface has a tongue (not shown). For the right side wall 20 this arrangement is, however, reversed in that the upper edge surface of this side wall is provided with a groove 1 and the lower edge surface is provided with a tongue 2. Likewise, the forward edge surface of wall 20 has a tongue 2a while the rear edge surface has a groove (not shown). In other words the tongue and groove means are arranged in the edge surfaces of the side walls 20, 30 such that for one side wall the corner formed between the adjacent edge surfaces having tongue means is diagonally opposite to the corner of the other side wall formed between the adjacent edge surfaces having tongue means. This also applies to the corners formed between the edge surfaces having groove means. This arrangement permits to use only one single block which may be assembled with other blocks in different orientations.

The blocks of Figure 10 are S-shaped in view of the double L-shaped form of the web 40 interconnecting the two side walls 20, 30.

The figures 11 to 14 show some examples of construction using the insulation block B₁ described hereinbefore.

Figure 13 for instance shows how a wall is constructed with the insulation blocks B₁ when passing a floor 10 without interrupting the insulation and it will be seen that this problem is easily solved by the use of an adaptor slab 9 having a height equal to the thickness of floor 10.

It should be noted that within the scope of the invention the insulation block is not bound to having an S-formed cross-section, but may have a cross section formed like a double "S", and "M" or a double "M".

It will be obvious to a person skilled in the art that the internal corners of all cavities in practice will be slightly rounded and not sharp, to avoid stresses and possible breakages at these points. Accordingly the drawings are to be considered as merely illustrating schematical sketches.

The blocks according to the invention are made by moulding of concrete and provide a simplest possible adaptation to the various construction methods. The blocks may be stacked in dry condition or be connected by binding (as in brick-laying) and standard mats may be used as insulation material for instance divided simply in halves.

The most important advantages in a system of hollow construction blocks according to the invention is found in the fact that the blocks are very light in weight and at the same time have sufficient strength and in themselves provide considerable insulation. Furthermore the blocks can be manufactured at low cost and afford the possibility of constructing a wall or similar structure in a simple, quick and safe way. A completed wall or the like may be surface treated

in a known manner to provide a ready-made front.

Referring now to Figure 15, a double S block 50 is shown having side walls 20, 30 provided with grooves and tongues arranged as described hereinbefore with respect to the insulation block B₁ of Figure 10. The web 52 inter-connecting the two side walls is substantially U-shaped to form a block 50 of double S-form.

The block 60 shown in Figure 16 also corresponds to the insulation block B₁ of Figure 10 as far as the arrangement of the grooves and tongues in the side walls is concerned, but it has a modified web 62 which is generally O-shaped to form a block of double H form.

Finally, the block 70 of Figure 17 also has the grooves and tongues arranged as explained hereinbefore with respect to the block of Figure 10 but it comprises an intermediate wall 72 between the side walls 71, 73 and three webs 74 interconnecting the intermediate wall 72 and the side walls 71, 73.

CLAIMS

1. Hollow building block comprising two laterally spaced side walls interconnected by at least one web means, and having at least one cavity with open top and bottom, characterized in that horizontal and vertical edge surfaces of said side walls are provided with tongue and groove means, each side wall having in a first pair of adjacent edge surfaces tongue means and in the other pair of adjacent edge surfaces groove means, the tongue and groove means in each of the side wall edge surfaces being dimensioned so as to be closely receivable in groove and tongue means of adjacent blocks.

2. Hollow building block according to claim 1 characterized in that the tongue and groove means are arranged in the edges of said side walls such that for one side wall the corner formed between the adjacent edge surfaces having tongue means is diagonally opposite to the corner of the other side wall formed between adjacent edge surfaces having tongue means, this also applying to the corners formed between edge surfaces having groove means.

3. Hollow building block according to claim 1 or 2, characterized in that said integral web is shaped so as to provide a block having an S, a double S, an M or a double M form.

4. Building block according to claims 1 or 2, characterized in that an intermediate wall is disposed between said laterally spaced side walls, said intermediate wall being connected by web means to both of said spaced side walls.

5. Hollow building block system based on the combination of module blocks according to claim 1, 2, 3 or 4 having tongue and groove form in horizontal and vertical direction, the system comprising in combination whole module blocks, half module blocks and quarter module blocks supplemented by corner blocks and insulation blocks for the construction of fundamentals, walls, partitions, pillars etc, the module block being rectangular and comprising a cavity therethrough

with open top and bottom.

5 6. The system of claim 5 wherein the module block is asymmetrical about a central horizontal plane, the side wall edge surfaces having groove and tongue means for assembly with other blocks, and the blocks when assembled forming cavities to be filled with insulation material reinforcing members, etc.

10 7. The system of claim 5, wherein the module block is asymmetrical about a central transverse vertical plane, the module block having two webs forming concave end walls of the block, said end walls also having cutouts, said concave end walls and cutouts forming after assembly of the blocks 15 vertical and horizontal passages for receiving reinforcing rods.

20 8. The system of claim 6, wherein the block has a cross sectional form as seen in horizontal assembling direction producing at least one cavity suitable for insulation (thermal and sound) in the form of predimensioned mats, when two blocks are positioned upon each other "back against back", for instance blocks having an "S" cross section, a double "S", "M" or double "M"-form.

25 9. The system of claim 5, wherein the cavities of the blocks are filled with thermal or sound insulating material such as polystyrene, rock wool etc.

30 10. The system of claim 5, wherein the cavities of the blocks are filled partly with insulation material and partly with concrete.

35 11. The system of claim 8, wherein the blocks form cavities for insulation at the edge of concrete floors in cooperation with adaptor slabs corresponding to the thickness of the floor.

40 12. The system of claim 5, wherein the corner blocks are comprised of one half module form and one half having the tongues substituted by pyramidal points or tips provided at the four corners of a square, the side length of which equals the distance between grooves.

13. The system of claim 12, wherein the corner blocks have one smooth end wall.

45 14. The system of claim 12, wherein the combined block by the assembling with another combined block or with a corner block will form a cavity for filling with moulding material to assure the tightness of the construction.